States National Museum two specimens of this same series and labeled the same as the Walker type. It is a safe assumption that Walker received his specimen from Professor Uhler.

I am indebted to Dr. Carl J. Drake, now studying at the British Museum, for detailed data attached to the Walker type specimen.

From all of the evidence at hand, the locality record "Santa Cruz, Cal." cannot be accepted. Although there is a Santa Cruz, California, Walker's type could not have come from there. It is quite evidently a case of mis-labeling. In a long series of specimens from various localities in California and the other Pacific Coast States there is no occurrence of Say's species which is distributed practically all over the United States east of the mountains. Since this locality label might refer to Colorado, diligent research revealed that no such locality ever existed in that state.

It therefore becomes necessary to consider this West Coast species as new. A glance at the map shows there is some overlapping in the distribution of the two species in southern Arizona and western Texas, but an examination of the specimens involved shows that there is no intergrading of the two species.

NEARCTIC SPECIES IN THE LIRIOMYZA PUSILLA COMPLEX No. 1 INTRODUCTION

(Diptera: Agromyzidae)[1]

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A revision of the species in the genus *Liriomyza* that key to *Agromyza pusilla* in either of Malloch's two keys (1913, 1918), first mentioned by Frick in 1952, is still a long way from completion. However, the urgent need for names for economic species in this group has prompted this series of papers. At present, two California species of economic importance are sufficiently well known to warrant separate descriptions. Their descriptions will form part two of the series.

Frost (1943) made the first attempt to clarify the status of several species in this group. However, the problem of the many very similar species forming a group within the genus *Liriomyza*

[1] Scientific Paper No. 1313, Washington Agricultural Experiment Stations, Pullman, Project No. 1062.

[2] The writer is grateful to M. T. James for reading and evaluating this manuscript.

will have to be attacked much as it was in Europe between 1920 and 1932. In order to separate the Palaearctic species, Hendel, Hering, and de Meijere were required to rear adults, determine larval host plants, study larval and pupal characters, and correlate these with the adults. Their results (Hendel, 1932, 1936), considering only the species synonymized by Malloch (1913) and Frost (1924) under *L. pusilla*, are shown in Table 1.

The species in the genus *Liriomyza* can be separated into several groups. This one, the so-called *pusilla* complex, is composed of a number of very similar species having the following characters in common:

1. Antennae with third segment rounded and bright yellow.
2. Genovertical plates (orbits) not prominently raised above the eyes.
3. Mesonotum without a yellow spot immediately anterior to the scutellum.
4. Mesonotum with two to four rows of acrostichal setae.
5. Femora predominately yellow but sometimes heavily marked with black spots and streaks.
6. Wing with M + M (posterior) crossvein present.

TABLE 1.—Species synonymized by Malloch (1913) and Frost (1924) under *Liriomyza pusilla* and subsequently separated by Hendel (1932, 1936).

Specific Name	Larval Host Plants and Notes
pusilla Meigen, 1830	*Hieracium, Sonchus* spp.
annulipes Meigen, 1830	Not an agromyzid
pumila Meigen, 1830	*Achillea* spp.
strigata Meigen, 1830	Most omnivorous *Liriomyza* sp.
exilis Meigen. 1830	Synonym of *strigata*
orbona Meigen, 1830	Host plant unknown
pusio Meigen, 1830	*Tragopogon* spp.
puella Meigen, 1830	*Lampsana, Prenanthes, Sonchus*, spp.
amoena Meigen, 1830	*Sambucus* spp.
blanda Meigen, 1830	*nomen dubium*
pascuum Meigen, 1838	*Euphorbia* spp.
brassicae Riley, 1844	Many Cruciferae
trifolii Burgess, 1880	Synonym of *congesta* Becker, 1903
	Many Leguminosae

According to this definition several *Liriomyza* species, the names of which have appeared in North American literature, are excluded (Table 2). To date nine species that belong to this group have been reported from North America. These, together with known larval host plants and distributions, are given in Table 3.

TABLE 2.—Names of species that have appeared in North American literature but excluded from the *pusilla* complex as defined in this paper.

Specific Name	Larval Host Plants	Excluding Characters
flaveola Fallén, 1823	Many Gramineae	Mid and hind femora black
scutellata Fallén 1823	.....	Not an agromyzid
orbona Meigen, 1830	Unknown	Infuscated third antennal segment
deceptiva Malloch, 1918	Unknown	Genovertical plates very strongly raised above eye margin
holti Malloch, 1924	Unknown	Angulate third antennal segment
langei, Frick, 1951	Pea, aster, spinach, sugar beet, celery	Infuscated third antennal segment

It is my intent to provide descriptions and comparisons between species so that others may determine the species name of their specimens with a reasonable degree of accuracy. The specific purpose of this introductory paper is to provide figures and descriptions of characters that will be used in future descriptions. I have attempted to use characters that can be seen and measured with a stereoscopic dissecting microscope equipped with 15× oculars, 6× objective, and an ocular net reticule ruled into 0.5 mm. squares.

Liriomyza brassicae (Riley), 1884, is considered a representative species and specimens have been used to illustrate certain characters. Each specimen must be oriented so that the seta being measured for length is perpendicular to the line of vision. The wings also must be perpendicular to the line of vision in order to measure accurately the lengths of certain veins. When setal lengths are used, the longer of a pair has always been chosen over the shorter. For example, if the right-hand inner postalar is twice as long as the corresponding left-hand seta (as frequently occurs), the right-hand seta has been used for measurement.

Head.—Table 3 shows the major characters that subdivide this complex into four distinct segregates. The inner vertical seta usually arises at the edge of the black of the vertex when stated, "Both VT on black" (Fig. 1, C.). When the outer vertical is the

TABLE 3.—Names of species that have appeared in the North American literature included in the *pusilla* complex as defined in this paper, separated by major characters.

Character	Specific Name	North American Larval Host Plants	Known Distribution
Both VT Setae on Yellow (Fig. 1, A)	*pusilla* Meig., 1830, s.s.	*Sonchus* spp. ?	U.S. ?, Europe
	congesta Becker, 1903	*Vicia*, *Trifolium*,, and *Medicago* spp.	Throughout U.S., Europe
	allia Frost, 1943	*Allium* spp.	Iowa
	phaseolunata Frost, 1943	Lima bean	New Jersey
VTI on Yellow, VTE on Black (Fig. 1, B)			
Both VT on Black (Fig. 1, C.)	*eupatorii* Kalt, 1874	*Solidago* spp.	Washington, Europe
	verbenicola Hering, 1951	*Verbena* spp.	New Mexico, Utah
Both VT on Black, GVP Infuscated (Fig 1, D)	*virgo* Zett., 1848	Unknown[3]	Kansas ?, Europe
	brassicae Riley, 1884	Many Cruciferae, Nasturtium	Throughout U.S., Europe
	propepusilla Frost, 1954[4]	Unknown	Kansas

[3] The larvae mine **Equisetum** spp. in Europe.

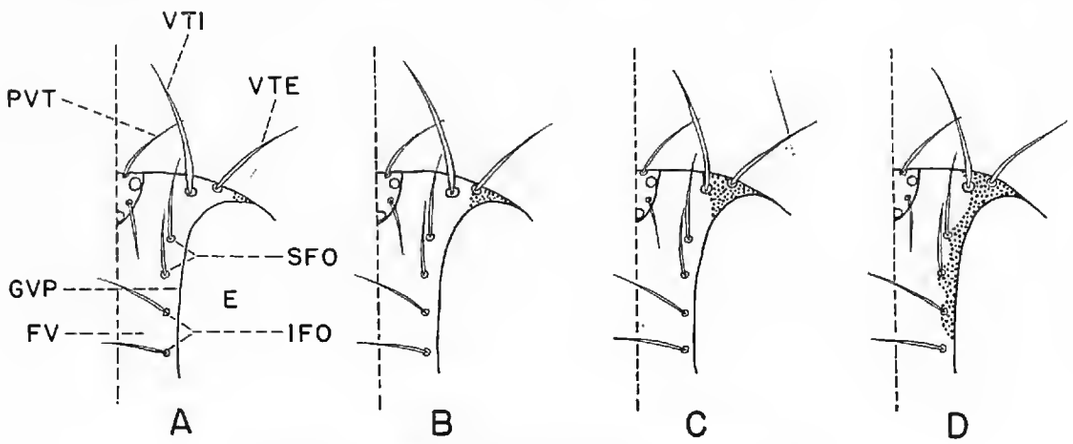
[4] New name for **subpusilla** Frost, 1943.

only seta on black, it also is usually at the edge of the black (Fig. 1, B). With teneral specimens the black area between the two vertical setae is frequently almost indistinguishable from the yellow. The infuscation of the genovertical plates (Fig. 1, D) is frequently narrower than the space between the frontoorbital setae and the eye margin. In teneral specimens this darkening frequently does not appear, a condition which may lead to confusion in determination. Each specimen should be kept alive for about 24 hours before being killed.

Mesonotum.—The relative lengths of several thoracic setae are of importance in separating species, as are the colors from which

they arise. The presutural (Fig. 2) arises at the edge of the black of the mesonotum. In some species the base touches, or is totally on, the yellow of the lateral margin, or the base is entirely on the black. This is best seen in a cephalic aspect of the specimen. The intraalar is frequently absent, or equal in size to an acrostichal seta. In some species it is twice or more the length of an acrostichal. Fortunately, the intraalar can be distinguished by its location near the posterior end of the intraalar row and its oblique direction pointing it to the fourth (posterior) dorsocentral. The number of setulae in the intraalar row, *i.e.*, between the dorsocentral row and the lateral margin of the mesonotum and posterior to the transverse suture, is of some importance, although much overlapping exists between species. The relative length of the first dorsocentral to the fourth is of more value than the relative length of the second or third to the fourth. The lengths are easily measured from an anterior view of the mesonotum. The relative length of the inner postalar to the outer postalar makes an excellent specific character. These are also measured from an anterior view of the mesonotum. In cases where the wings hide the outer seta, the fourth dorsocentral may be used for measurement. The fourth dorsocentral is slightly longer than the outer postalar, but not enough longer to influence the proportions being measured.

Scutellum.—The basal scutellar setae are important only in

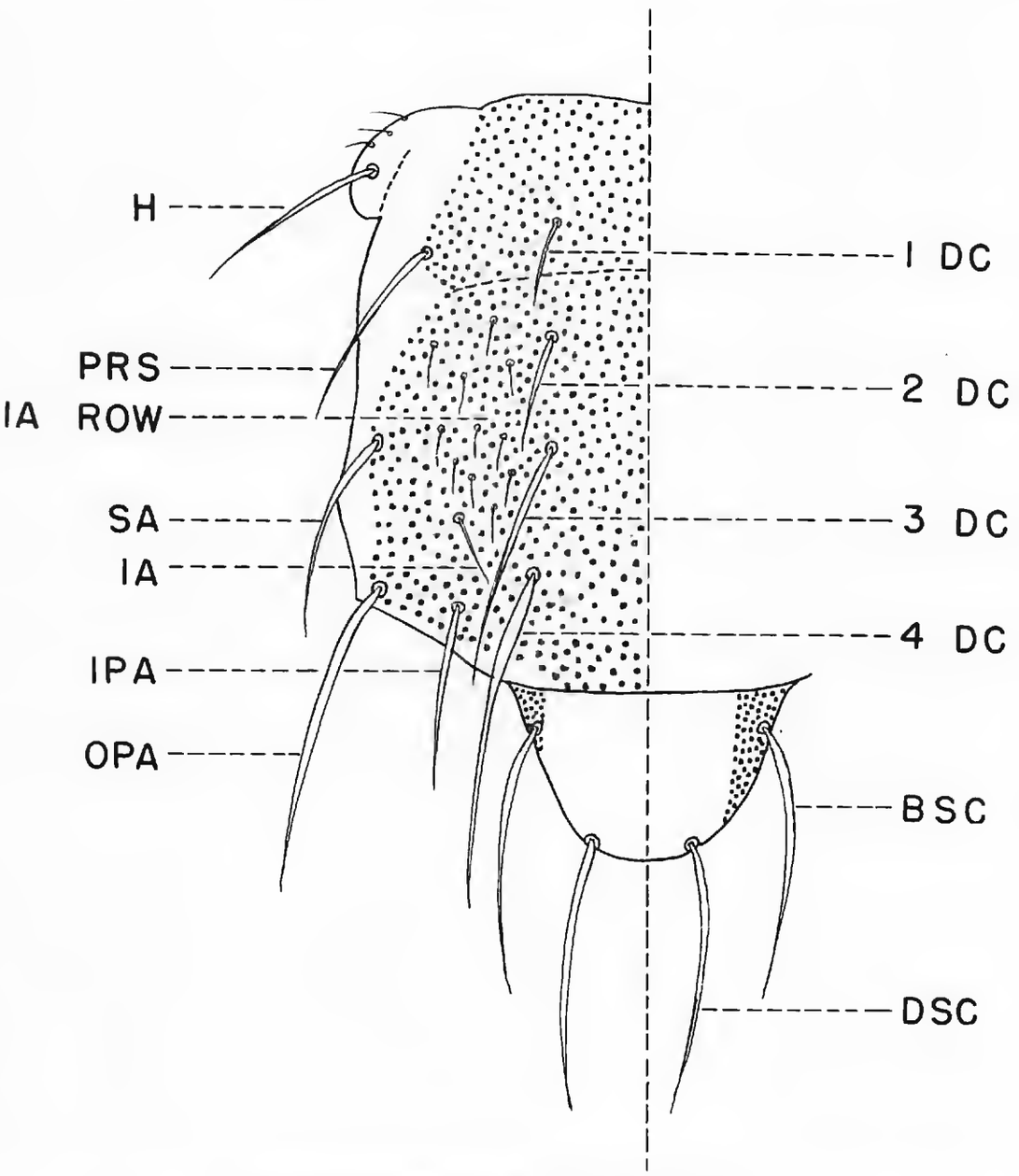


EXPLANATION FOR FIGURE 1

Fig. 1. Portion of the right side of head, anterior view, showing: both VT setae arising from yellow (A); VTI on yellow, VTE on black (B); both VT on black (C); both VT on black, GVP infuscated (D). Areas: E—eye; FV—frontal vitta; GVP—genovertical plate (orbit). Setae: PVT—postvertical; VTI—inner vertical; VTE—outer vertical; SFO—upper frontoorbital; IFO—lower frontoorbital. The orbital setulae, placed between the frontoorbital setae and the eye margin, have been omitted for simplicity.

relation to their bases and the lateral black triangles of the scutellum. The base may be on yellow (not shown), at the edge of the black (shown on left side), or the black may extend centrally well beyond the setal base (right side).

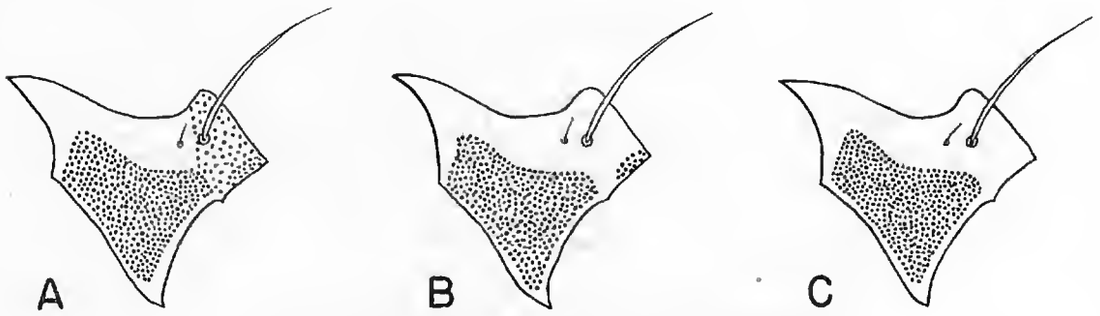
Pleural Area.—The anepisternum (mesopleura) varies from



EXPLANATION FOR FIGURE 2

Fig. 2. Left half of mesonotum and scutellum of *L. brassicae,* right half of scutellum of *Liriomyza* n. sp., showing typical arrangement of setae. The acrostichal setae and the setae of the intraalar row anterior to the transverse suture have been omitted for simplicity. Setae: H—humeral; PRS—presutural; SA—supraalar; IPA—inner postalar; OPA—outer postalar; IA—intraalar; IA ROW—intraalar row; 1 DC—first dorsocentral; 2 DC— second; 3 DC—third; 4 DC—fourth dorsocentral; BSC—basal scutellar; DSC—distal scutellar.

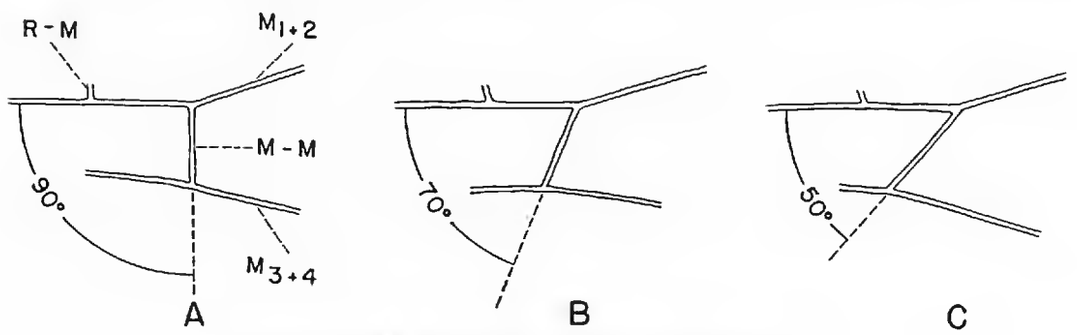
nearly all black to all yellow, depending upon the species. Since the pattern of black on yellow offers a good specific character, illustrations have not been included here. The katepisternum (sternopleura) has three types of posterior markings. The first is broad, covering the entire area caudad of the katepisternal seta (Fig. 3, A). The second consists of a narrow band (B). This band is always darker in the broad type. The third katepisternum has no infuscation posterior to the triangle (C). These markings are useful in species identification, providing the specimens are not teneral.



EXPLANATION FOR FIGURE 3

Fig 3. Katepisternum showing the three types of posterior markings: broad (A); narrow (B); and none (C).

Wing.—Among the more useful characters of the wings are the position and angle of the M + M (posterior) crossvein. This vein may be closer to, equal to, or farther from the R + M crossvein than its own length. The angle that M + M forms with the penultimate section of M_{1+2} (the section of which R + M connects) is important (Fig. 4). The angle may be perpendicular or 90°



EXPLANATION FOR FIGURE 4

Fig. 4. Portion of wing showing three representative angles of crossvein M+M to the penultimate section of M_{1+2}: perpendicular (A); 70°—85° (moderate) angle (B); and 45°—65° (strong) angle (C). Veins: M_{1+2}—fourth longitudinal; M_{3+4}—fifth longitudinal; R+M—radiomedial or anterior crossvein; M+M—medial or posterior crossvein. A and B, wing of *L. brassicae; C,* wing of *Liriomyza* n. sp.

(A) moderate, 70° to 85° (B), or strong, 45° to 65° (A). These are arbitrary figures and were chosen as representative of the several angles observed while preparing descriptions.

SUMMARY

A group of very similar appearing *Liriomyza* species, the so-called *pusilla* complex, is defined. All species previously reported in North America are included or excluded on the basis of the definition of the group. Morphological characters of value in subgroup and species determination are described and figured.

LITERATURE CITED

FRICK, K. E.

1952. Four new Hawaiian *Liriomyza* species and notes on other Hawaiian Agromyzidae. Haw. Ent. Soc. Proc., 14:509–518.

FROST, S. W.

1924. A study of the leaf-mining Diptera of North America. Cornell Univ. Agric. Exp. Sta. Mem., 78:1–228.

1943. Three new species of Diptera related to *Agromyza pusilla* Meig. Jour. N. Y. Ent. Soc., 51:253–262.

HENDEL, F.

1932. Agromyzidae. *In* Lindner: Die Flieg. palaearkt. Reg., 59 (58, 66):193–320.

1936. *Ibid.*, 59 (96):513–570.

MALLOCH, J. R.

1913. A revision of species in *Agromyza Fallén*, and *Cerodontha* Rondani. Am. Ent. Soc. Amer., 6:269–336.

1918. A partial key to species of the genus *Agromyza*. Canad. Ent., 50:76–80.

ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED USE OF THE PLENARY POWERS IN CERTAIN CASES FOR THE AVOIDANCE OF CONFUSION AND THE VALIDATION OF CURRENT NOMENCLATORIAL PRACTICE (A.(N.S.)21)

Notice is hereby given that the possible use by the International Commission on Zoological Nomenclature of its Plenary Powers is involved in applications relating to the under-mentioned names included in Parts 1 and 2 of Volume 11 of the *Bulletin of Zoological Nomenclature*, both of which Parts were published 31st January, 1955:

(1) *Applications in Part 2 of Volume 11*

(1) *Neanura* MacGillivray, 1893, and *Hypogastrura* Bourlet, 1839, designation of type species for; *Achorutes* Templeton, 1835, supression of (Class Insecta, Order Collembola) (pp. 38-48) (Z.N.(S.)303).